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Harris

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[54] **BIASED POWER FEED DEVICE HAVING MEANS TO REDUCE BIAS DURING ADJUSTMENT**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[3] **B27B 5/22**; B27B 5/29

[52] **U.S. Cl.** ..... **83/419**; 83/422; 83/435.2; 144/242 R

[58] **Field of Search** ..... 83/419, 435.2, 431, 83/422; 144/242 R, 242 D, 242 H, 242 K, 247, 248, 249 R, 249 A

[56] **References Cited**

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Primary Examiner—James M. Meister

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[57] **ABSTRACT**

A device is provided to propel workstock to saw blades or other power tools and especially circular saws. The propulsion is effected by a friction drive preferably in the form of a pair of parallel belts engaging a surface of the workstock. The device is mounted for ready vertical adjustment at the will of the operator via a parallel linkage system which is held in any selected position by a gas spring that also provides a resilient bias to produce the necessary pressure for the friction drive. The device is additionally arranged for lateral adjustment.

14 Claims, 4 Drawing Figures

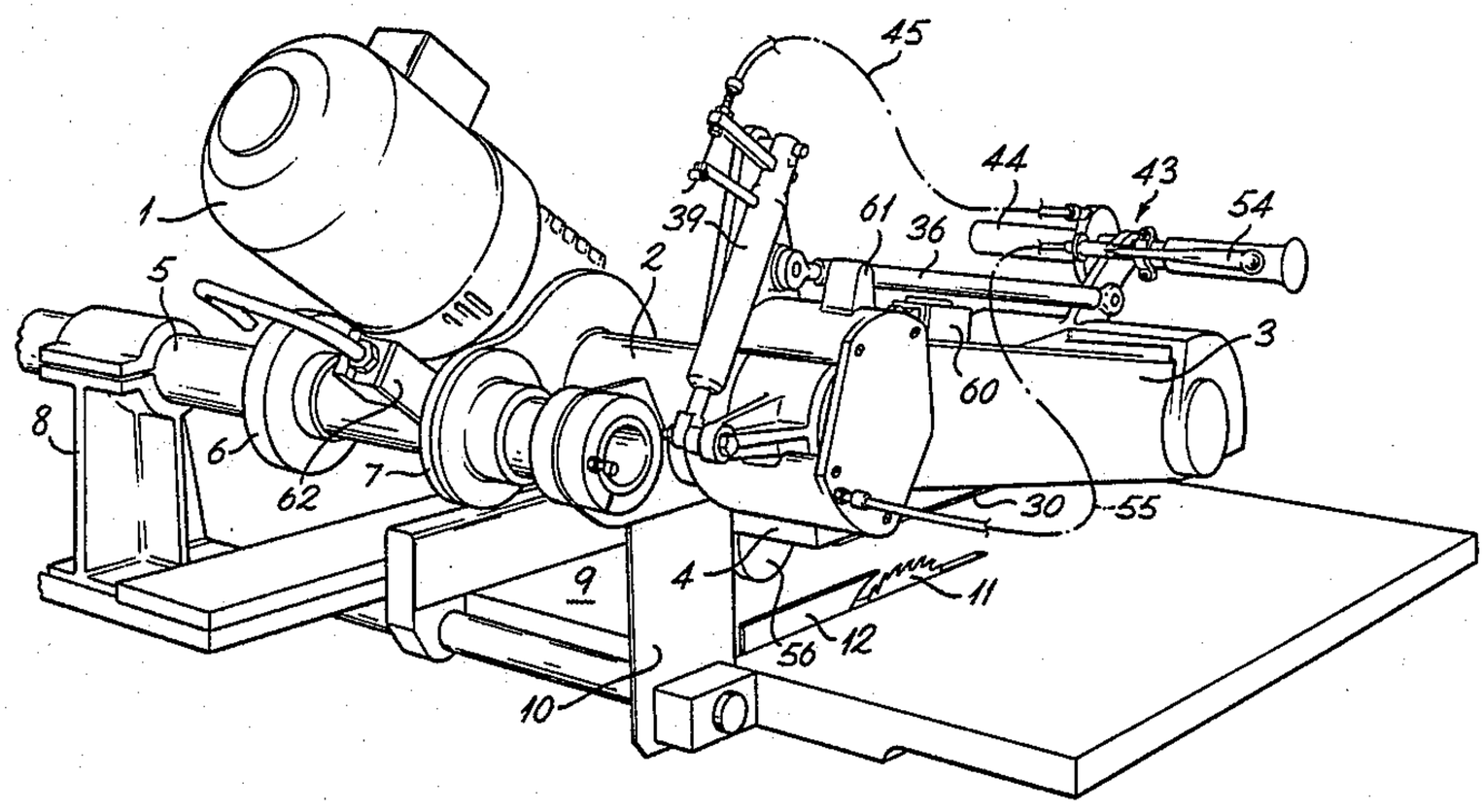
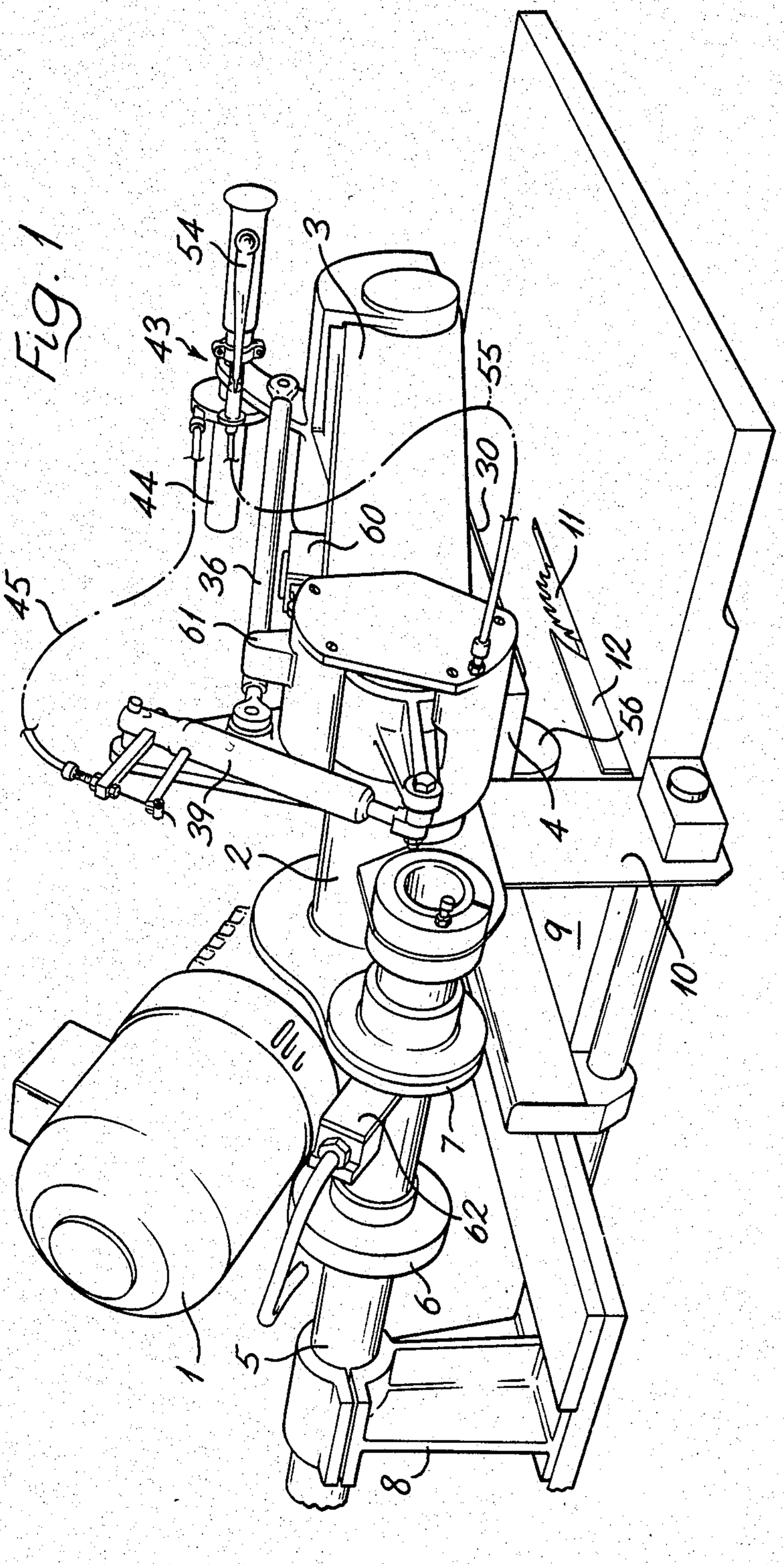


Fig. 1



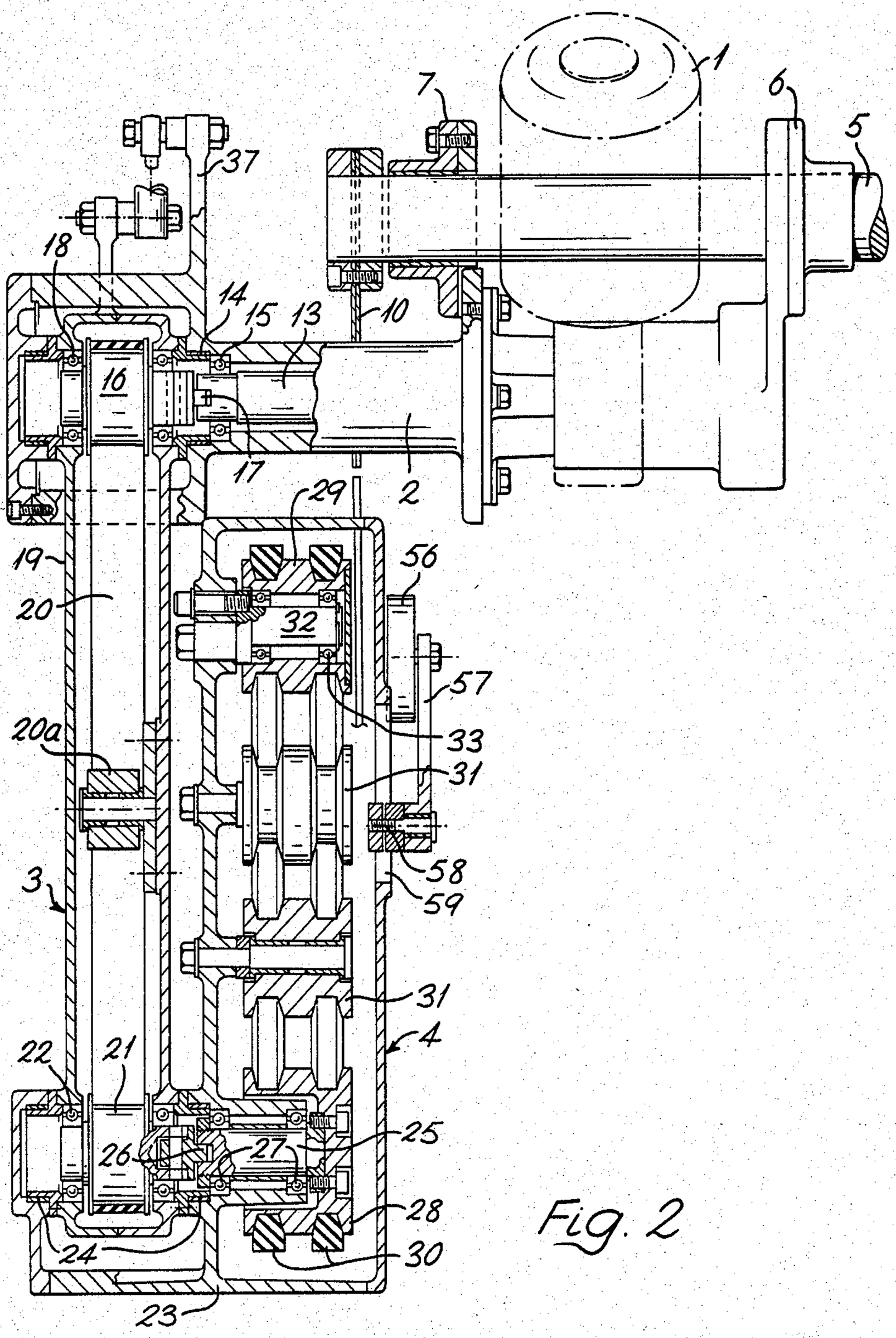

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Fig. 2

Fig. 3

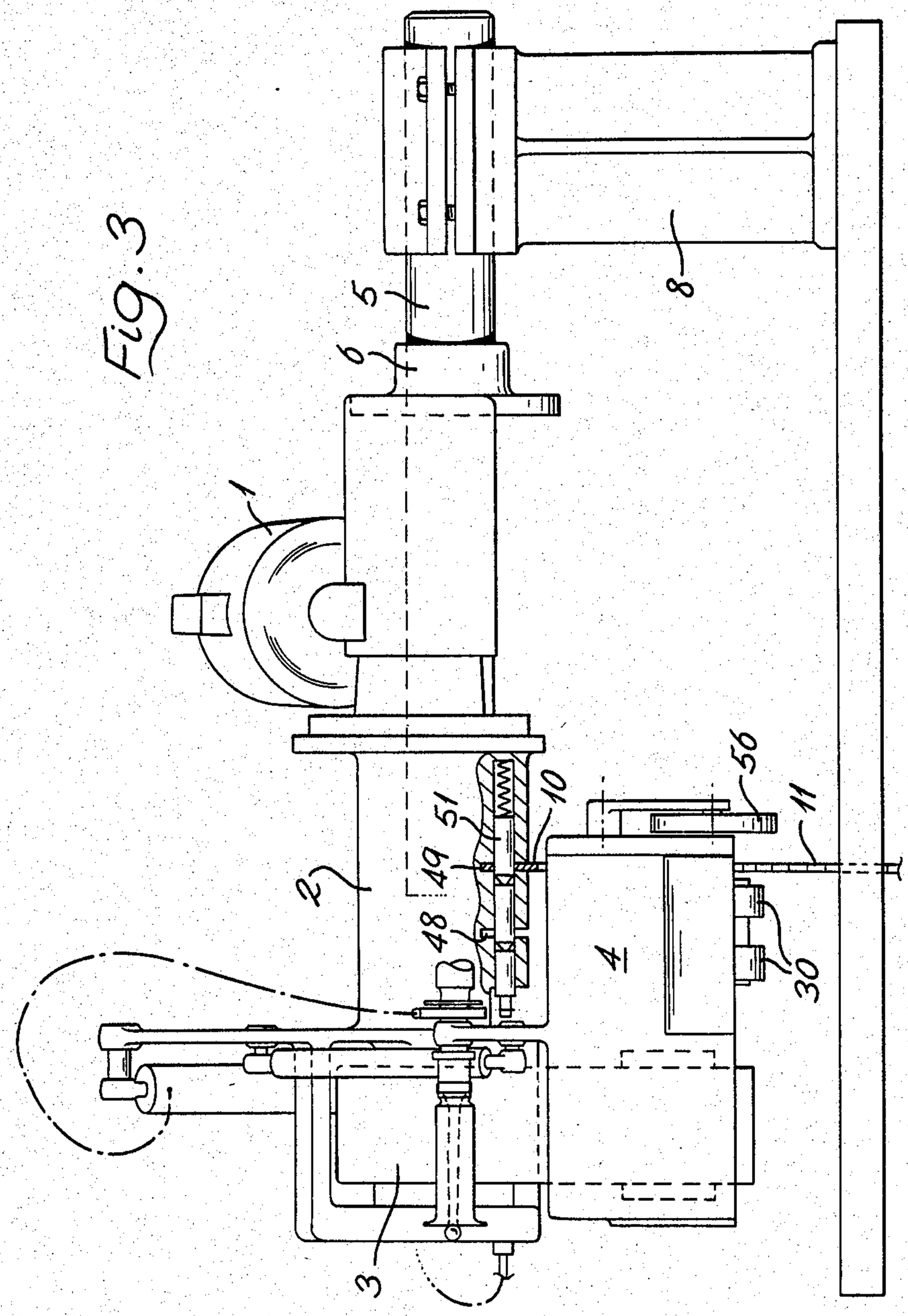
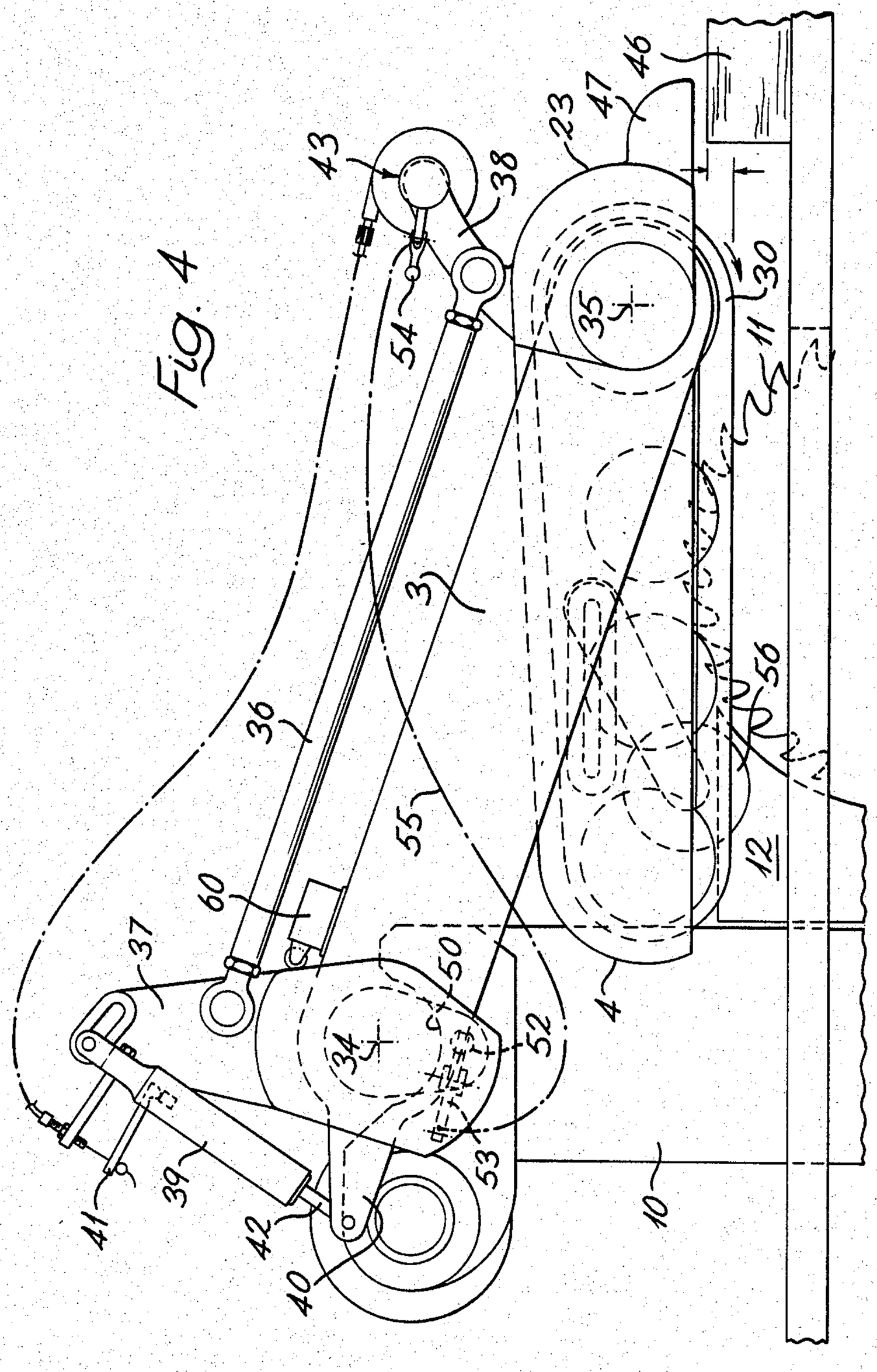


Fig. 4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BIASED POWER FEED DEVICE HAVING MEANS TO REDUCE BIAS DURING ADJUSTMENT

This invention relates to power feed devices for sawing machines or the like, that is to say to devices for propelling workstock to a saw blade or other power tool and especially timber to circular saws. Such devices not only promote good quality work and productivity by providing a constant feedrate of workstock and reducing operator fatigue, but also contribute to safety by obviating the need for hand-feeding of workstock.

Heretofore however power feed devices have been heavily built and have lacked versatility, particularly due to the fact that they were not readily capable of adjustment of suit workstock of varying dimensions. Consequently machinists have found it easier to feed workpieces by hand thus increasing the probability of an accident.

It is the object of the invention to provide a power feed device that may be swiftly and easily adjusted.

According to this invention a device for feeding workstock to a saw blade or like power tool, comprises friction drive means adapted to engage a surface of the workstock to propel the same, means mounting the said drive means for a range of movement in a direction to accommodate workstock the dimensions of which vary in that direction, means to hold the said drive means in any selected position within the said range of movement and resiliently to bias the same against movement away from that position, means operable at least to reduce the bias to facilitate selected adjustment of the drive means and means automatically to maintain the drive means in a substantially fixed orientation throughout the said range of movement.

Preferably the means to hold the drive means and resiliently to bias the same comprise a gas spring and the means operable to reduce the bias provided by the spring comprise means operatively to interconnect the ends of the gas spring.

Desirably provision is made to effect lateral adjustment of the drive means when but only when the same are positioned clear of the saw blade or other tool.

In a preferred embodiment the drive means include a parallel pair of driven belts arranged to engage the workstock the drive means being arranged to be adjusted between at least two positions, one in which the drive belts are located to one side of a saw blade and a second postion in which they straddle the same. For best results it has been found that along a part of their length first to engage workstock the belts should be set at an angle so as in use to direct workstock into contact with a fence associated with the saw blade.

The invention is described below with reference to the accompanying drawings in which:

FIG. **1** is a perspective view of a power feed device in accordance with the invention, mounted on the bench of a circular saw,

FIG. **2** is a part-sectional plan view of the device of FIG. **1**,

FIG. **3** is a front end elevation thereof, and

FIG. **4** is a side elevation.

Referring to the drawings, a power feed device comprises a drive motor **1** coupled to a drive housing **2** on which a drop arm assembly **3** is mounted and which in turn carries a feeder head **4**. The device is mounted on a horizontally extending support arm **5** by sleeve bearings **6** and **7**, the support rod **5** being clamped to a support pedestal **8** mounted on the saw table **9**. The support rod **5** is further supported by a plate **10** which is positioned on the saw table **9** in line with the saw blade **11** and its companion riving knife **12**. The motor **1** is conveniently a geared electric motor and the drive shaft **13** (see FIG. **2**) extending therefrom is contained within the housing **2** on which the drop arm **3** is pivotally mounted by trunnions **14**. The shaft **13** is supported in bearing **15** and is connected to drive pulley **16** via a sliding coupling **17**, the drive pulley **16** in turn being mounted in bearings **18** located in the casing **19** which the drop arm **3** comprises. A toothed belt **20** contained within the casing **19** connects the drive pulley **16** to a driven pulley **21** supported by bearings **22** within the casing **19** in a similar manner to the pulley **16**. The belt **20** may be tensioned by a jockey pulley **20***a*. The casing of the feeder head **4** is pivotally supported on the arm **3** by trunnions **24**.

A drive shaft **25** is coupled to the driven pulley **21** by a sliding coupling **26**, the drive shaft **25** being located in bearings **27** seated in the feeder head casing **23**. A drive wheel **28** is mounted on the drive shaft **25** and connected to a driven wheel **29** by a pair of V-belts **30** which are also supported by intermediate pressure rollers **31**. The driven wheel **29** is mounted on an eccentric shaft **13** located by bearings **33**, the eccentric shaft serving as means for adjusting the tension in the V-belts **30**. The V-belts are preferably faced with high friction material (not shown). Natural rubber has proven to be efficatious. The rollers **31** enable the contact force that can be applied between the belts and a workpiece to be increased.

The trunnions **14** and **24** enable the drop arm and the feeder head to pivot respectively about the axes **34** and **35** (see FIG. **4**) but the feeder head **4** is maintained in a constant orientation by a tie rod **36** extending between a bracket **37** fast with the drive casing **2** and a bracket **38** fast with the casing **23** of the feeder head **4**, the tie rod **36** thus completing an effective parallelogram linkage system. The length of the tie rod **36** is conveniently made adjustable so as to enable the feeder head to be set in the desired spatial dispostion which will normally be such that the V-belts **30** extend parallel to the surface of the saw bench, or if desired at a slight inclination thereto.

The combined weight of the drop arm **3** and feeder device **4** is counterbalanced by a gas spring device **39** extending between the bracket **37** and an arm **40** fast with the casing of the drop arm **3**. The gas spring device as is known is fitted with a valve (not shown) operable by a lever **41** to enable its piston rod **42** to be pneumatically set at any desired position throughout its operating range. Opening of the valve operatively interconnects the ends of the spring so that the differential force across the piston of the gas spring provides a force on the piston rod **42**.

This force wil normally be insufficient to lift the feeder head assembly but will be such as to reduce the additional effort required to lift the assembly to a level well within the capacity of the operator. With the valve closed the piston is pneumatically locked in position requiring a substantial force to move it in either direction, which force is selected to be more than adequate to balance the weight of the drop arm and feeder device so as to hold the latter in its desired set position.

It will be noted that by arranging only for movement of the drop arm **3** the feeder head **4** to effect vertical

adjustment, the weight of the motor **1** and its associated gearing and transmission does not have to be contended with. Furthermore the distribution of the weight of the motor and associated parts in relation the support rod **5** is such that the whole assembly may be rotated about the rod **5** without great effort. Balance weight may of course if desired be provided to facilitate either the vertical adjustment of the feeder head **4** or rotation of the whole assembly.

The assembly is arranged to be vertically adjustable by means of a handle **43** mounted on the bracket **38**. One grip **44** of the handle is conveniently in the form of a twist grip connected via a Bowden cable **45** to the lever **41** of the gas spring. Upon operation of this lever the device can readily and swiftly be vertically moved to any position within its designed range of movement, the device being held in the selected position upon release of the lever **41**.

In use the feeder device will normally be placed in a position such that the bottom surface of the device belts **30** is at a level below the top surface of a workpiece offered to them. A workpiece such as that indicated at **46** in FIG. **4** will be manually pushed against the drive belts **30** to enable the latter to grip the workpiece and cause it to be fed across the machine table to the saw blade **11**. As a result of the feeder device being initially set at a height such that the drive belts **30** are set at a distance (such as indicated by the arrows in FIG. **4**) below the top surface of the workpiece, as the latter is gripped by the drive belts the feeder head **4** will be forced upwards against the internal pressure of the gas spring **39** which thus provides the necessary downward force to enable the belts **30** to tranverse the workpiece through the saw.

To simplify setting of the feeder head a rearwardly extending nose **47** is provided on the casing **23**, the undersurface of the nose being at a predetermined distance (for example 20 mm) above the contact surfaces of the belts **30**. Then to set the feeder head for any particular workpiece only entails releasing the gas spring valve by turning the twist grip **44** and lowering or raising the head until the nose **47** rests on the upper surface of the workpiece. The nose additionally serves as a barrier to keep the operator's fingers from the drive belts **30**.

In addition to being vertically adjustable provision is also made for the feeder device to be laterally adjusted. Although this adjustment may be between a greater number of positions, in the embodiment illustrated it is between two positions, one in which the feeder head **4** is so disposed that the saw blade **11** is located between the pair of drive belts **30** and a second position in which the saw is disposed to one side of the drive belt which is in the position illustrated in FIGS. **2** and **3**. As best seen in FIG. **3** the drive housing **12** is provided with a pair of curved locating slots **48** and **49** which are arranged to be alternatively mated with a complementary curved surface **50** (see FIG. **4**) formed in the upper surface of the support plate **10**. When in either one of the two locations thereby provided the housing **2** is locked to the plate **10** by means of plungers **51** slidably mounted within the housing **2** and which enagage an aperature **52** provided in the plate **10**. The plungers **51** are biased into engagement with the aperture **52** and are arranged to be moved against the bias by a rocker **53** conveniently operable by a caliper **54** mounted on the handle **43** and connected to the rocker by a Bowden cable **55**. When the plungers **51** are disengaged from the plate **10** the whole assembly may be pivoted about the support rod **5** to the extent necessary to disengage the plate **10** from a locating slot whereafter the whole assembly may be slidden along the support rod **5** to bring the plate **10** into registry with the other locating slot. It will be noted that unless the plate **10** is brought into registry with a locating slot it prevents the assembly from being lowered so that it is not possible to mis-align the assembly.

When the feeder heat **4** is positioned such that the saw blade **11** is located between the belts **30** then both the stock material and the cut-off component will be fed thereby past the saw. This will not be the case when the feeder head **4** is positioned to one side of the saw blade, and to avoid any possibility of the cut-off piece moving back towards the operator a roller **56** is provided mounted on the arm **57** which is secured by a pivot **58** slidable for optimum positioning in a slot **59** formed in the casing **23** of the feeder head **4**. The weight of the roller **56** resting on a cut-off piece is sufficient to hold the same. When not required the roller may be swung upwardly out of the way.

A safety switch **60** (see FIG. **4**) mounted on the arm **3** is operated when it touches an abutment **61** (see FIG. **1**) upon raising of the arm **3**. Likewise a safety switch **62** (see FIG. **1**) is operated when the feed device is moved between its two operating positions, the function of the switches being to switch off power to the motor **1** and/or to the saw blade should it be dangerously exposed.

Although in the embodiment described and as is preferred the feeder head is provided with the drive belts **30**, other drive mechanisms could of course be employed, for example individually powered and sprung rollers.

To obtain best results with drive belts and in particular to ensure that workstock is held against a fence such as is commonly associated with a circular saw it has been found desirable that along a part of their length first to engage workstock the belts **30** should be set at an angle so as to direct workstock into contact with the fence. A suitable angle for this purpose is of the order of $\frac{1}{2}°$ to $1\frac{1}{2}°$ towards the fence and the proportion of the length of the belts so angled may be approximately a first third of their length, such as for example in the embodiment described the length extending between the drive wheel **28** and the adjacent roller **31**. The remainder of the length of the belts is advantageously set at an angle of approximately $\frac{1}{2}°$ in the same sense as the first parts thereof.

I claim:

1. A device for feeding workstock to a new blade or like power tool, comprising friction drive means adapted to engage a surface of the workstock to propel the same, means mounting the said drive means for a range of movement in a direction to accommodate workstock the dimensions of which vary in that direction, means to hold the said drive means in any selected position within the said range of movement and resiliently to bias the same against movement away from the position, means operable at least or reduce the bias to facilitate selected adjustment of the drive means and means automatically to maintain the drive means in a substantially fixed orientation throughout the said range of movement.

2. A device as claimed in claim **1**, in which the means to hold the drive means and resiliently to bias the same comprise a gas spring.

3. A device as claimed in claim **2** in which the means operable to reduce the bias provided by the spring com-

prise means operatively to interconnect the ends of the gas spring.

4. A device as claimed in claim 1 in which provision is made to effect lateral adjustment of the drive means when but only when the same are positioned clear of the saw blade or other tool.

5. A device as claimed in any one of claim 1 in which the drive means include a parallel pair of driven belts arranged to engage the workstock.

6. A device as claimed in claim 5 in which the drive means being arranged to be adjusted between at least two positions, one in which the drive belts are located to one side of a saw blade and a second postion in which they straddle the same.

7. A device as claimed in claim 5 in which along a part of their length first to engage workstock the belts are set at an angle so as in use to direct workstock into contact with a fence associated with the saw blade.

8. A device as claimed in claim 7 in which the angle is of the order of $\frac{1}{2}°$ to $1\frac{1}{2}°$ to the direction in which the workstock is to be propelled.

9. A device as claimed in claim 7 in which approximately a first third of the length of the belts is set at the said angle.

10. A device as claimed in claim 9 in which the remainder of the length of the belts is set at an angle of approximately $\frac{1}{2}°$ to the direction of travel and in the same sense as the first parts of the belts.

11. A device as claimed in claim 1 for use in conjunction with a circular saw having a bench on which the drive means are mounted in which the means mounting the drive means comprise an arm arranged for rotation about an axis parallel to the axis of rotation of the saw, the drive means are pivotally secured to the arm and in which the means for automatically maintaining the drive means in a substantially fixed orientation comprise a parallelogram linkage system.

12. A device as claimed in claim 11 in which a gas spring is provided to act on the parallelogram linkage system as so to hold the drive means and resiliently to bias the same.

13. A device as claimed in claim 11 in which a motor and transmission means for powering the drive means are mounted for rotation about an axis parallel to the axis of rotation of the arm, the whole device being coupled for rotation with the motor and transmission.

14. A device as claimed in claim 13 in which the whole device is slidable along the first mentioned axis to effect lateral adjustment of the drive means, the device being lockable at predetermined positions along the said axis.

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